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N**Ring of Confidence**

Winner of the spot the HCW Assistant Editor Competition in HCW 121 was J Roberts of Chesham Street, London W1 who edged the least of you, truly in the school photo of the contest ranks of the computer press.

The photo, taken at Bournemouth's celebration of five years in business at Delecta Road way Centre produced some intriguing speculations about my identity but it was Mr Roberts who finally applied the winning smile and won a selection of software for his specimen.

Bryan Ralph — the secret is out

Workstation winner

Jim Phillips of Liscard, Manchester will soon be the proud possessor of a Micro Personal workstation after winning our competition in HCW 121. The workstation which provides challenge for MSU, keyboard and mouse, is adjustable for size, weighs in at over 200.

Dave, HCW's ergonomically designed editor noticed that the biggest advantage of the workstation was that on your normal design reduces finger

Lou's was the first entry pulled out of the hat to agree with Dave's warning of the work station. F B C A I

Surprise, surprise!

The Athlon's Advantage of the Month contest — and the Prize of £25 for the highest score will reach

Microsoft's Athlon's, the game with walk-through graphics, is now also available for Amstrad users.

Details of the lucky winner (just imagine what you could do with £25 — that's a year's supply of HCW's!) will be announced in a future issue of HCW; meantime enough is true!



MUD is on



"the Host in the machine"

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Group: Telecommunications etc

NEWS



Packing it in

Working on the principle that most people who buy a joystick will need to buy an interface, Valiant Electronics have brought out systemised product packs allowing a variety of joystick/interface combinations.

According to Valiant, the packs contain everything needed to connect the joystick to a particular user's computer. The joystick pack is available for the Spectrum, BBC, the C16 and Plan 4. From start at £30.95 for the C16.

Valiant Electronics, 200 Broad St, London NW4 6BA.

Valiant's Joystick Packs



Commodore have just introduced a better Value 64k Drive Master Pack especially for first time drive buyers.

Available for BBC, Electron, Spectrum or Dragon users, the pack consists of a single disc drive with the interface, user manual and connectors.

The package should not only upgrade your system but also increase storage capacity and price start at £149.

Commodore, Plaza Trading Ltd, Broad St, Gillingford, Dorset, GU8 3BA.

Commodore's Super Value 64k Drive Pack

At the show

Look out for the Microsoft stand this year. Just over Olympia during the PTA show, Microsoft will be unveiling a host of new products at the show and one of them, the Plus Sinclair Edition, will be of special interest to newspaper publishers.

The stand offers you to do everything you need to do to produce a slick-up newspaper page or more. Not only does it show you to pull this from broadcast and View but it also has a page make-up screen, a wordprocessing and graphics program so you can lay out your page with illustrations or even your own colour style. The Plus Sinclair Edition will be available initially for the BBC and costs £39.95.

Microsoft will show a My Mac, 128Kb floppy workstation, around the hall to promote the release of a new three-part pack of Mac files, one of them is called The Macintosh

Mac in which all the Mac files (except those who have to do it) to find the rest. The three-part pack will cost £14.95 and will be for the BBC, Spectrum and Amstrad.

An almost complete version of Turbo Pascal 3.0 will be available when at the Microsoft stand. For programmers and control systems involving the development of your robot series 803. The price will be available in 20 control the design, and will cost £1.95.

Microsoft have secured the rights to The Coding Game Show, a children's TV programme that is shortly to be computerised nationwide. Aimed at the under 10s and 10s parents, the video game show, on Microchips, is a learning and fun of the age that as a child and the software program will follow the same format. On the screen from Microsoft's a Designer Day II will be in with 'A Big Day' that will be held on the 24th of the year.

All mapped-out

MAP IT have come up with a drive letter number called Map Maker which — would you believe — helps adventure players with their drawing.

As an aid to both writing and playing, adventure games Map Maker does away with paper maps and using the special pen and plastic mat provided you can draw and then simply rub out with a damp cloth when finished.

So if you're tired of messy maps made the hard to erase, priced at £4.95, might help.

MAP IT, 186 Robert St, Gillingford, Hants, GU8 3BA.

LENSLOK

Locked out

Regular readers of HCW will be aware that there have been real changes in the law which makes the copying of software illegal. There have been fewer changes to make the process of copying more difficult.

Leading, again to change all this and looks set to give the public, whether amateur or professional, a hard time.

For at its most basic, Lenslok is a method of preventing a piece of software from being copied. It will try to prevent a buyer making a copy which at times passed as another copy. What it won't do, however, is prevent the owner of the program making a backup copy, in fact he can make as many backups as they like but they will only be able to use one of them.

So how can such a simple idea work at present? The principle is that the software cannot be used without the special "optical disc". You will have to type a code into the machine after loading which will make the program work and you can only do this with the disc in your hand.

The product is being marketed by ASAP Developments, a subsidiary company in the huge 1 Rotherhithe Roadings plc. "It was developed by John Frost, an electronics consultant and freelance scientist, who brought it to an fair marketing," revealed Mike Smith, managing director of ASAP. "We specialise in taking an idea from the invention to the market place and then in exactly the situation with the product."

In the case of a copy protection the market is of course the software houses whose products are being protected. ASAP started to develop software houses the development version of the product a couple of months ago and have had a mixed reaction. Some were very enthusiastic and others not quite so keen.

Some of the big names in the business have got behind the idea and there are a few locked products in the pipeline. The

product is currently cheap and can be simply produced in large numbers yet at the same time it has there is hope for a low cost as Tom Langford, chairman of SOGEM, suggests. "My only reservation would be the cost but if the system is taken up generally then that cost would be well be very difficult to raise. The price of the product is a concern for all those involved involved. If we (SOGEM) decided to incorporate the system we would not pass on the cost to the consumer, we would regard it as our own cost to safeguard our software."

The first product to feature the new system will be Parfitt's Elite on the Spectrum which is due for release during September. Further are expected for the time as Herbert Wright explained. "We are extremely pleased to be the first publisher to bring to the Lenslok. We have been thinking for some time of taking the initiative against piracy and Lenslok looks out of the syndrome of constantly refining disc and cassette protection systems."

"Such a formidable weapon warrants a measure of prestige game to launch it - Spectrum Elite is as big a launch as you can get." After will cost £14.95 but Herbert says that Lenslok, plays no part in the price, it would have been the same price without Lenslok, he claims.

ASAP claim that they can produce enough lenses for the Christmas software market but it remains to be seen if they can persuade a large number of software houses to take up the system.

With a potential market of 20 million a year it is perfectly possible that Mike's dream will come true. "I have this picture in my mind of a computer owner with a string of lenses similar to piles of credit cards that make his collection collect."

ASAP Developments, 62 Rotherhithe Road, London



How it works

The Lenslok product is a two part system, the first part being a plastic lens which is enclosed with each "locked" cassette when you buy it. The second part is a machine code routine which is installed in the program itself and which will give you a code to type in.

When a Lenslok-coded code appears you have to place the lens against the screen and then read the code from the TV or monitor. We have only seen a test reading but the procedure would be something like this:

First the screen needs to be set for test. There is a bar at the center which can be highlighted or contrasted and a square marker as long as the lens holder in your hand.

Then a test message appears which shows you to place the lens in position and get a read out. The only difficulty that can occur at this stage is that the lens is placed out of position but if you read the test message - usually the letters "OK" - then you are satisfied to have position.

Finally, the real coded message is displayed which you have 10 seconds to read after which you must try another. If you type the message in at the keyboard during the period then the game or utility will proceed as normal.

That's all there is to it. The game won't work without the code and you can't read the code without the lens, hence the protection.

For those who like a few more details the lens is really a series of grooves which can be used to store data that can be used to make up a protected character. So when the coded pattern appears on the screen the program moves the data into the screen under so that you can read the letters concerned.

The code is likely to have at least two lenses and they can be both copied or lower rate characters plus all the digits. The code is changed at each presentation and there is therefore no chance of a being remembered or written down.

Each Lenslok-coded product will have its own lens, which will not work for another product, whether from the same company or not. John Dewar, ASAP's technical director, has done his best and reckons that there are not even seven billion possible combinations, which should cope with most software for a few years to come.

The only way into the system is through the encryption code which usually produces the pattern. This is the obvious place for the program to start their cracking activities but they aren't going to find it easy.

Herbert Wright, Parfitt's UK Chief, admits that the game "isn't 100% secure. There is only one way to ensure full security and that is for each purchaser of a product to be issued with an armed security guard who goes home with the cover and makes sure that the product isn't copied." It looks as though Lenslok is a large step in the right direction for copyright at last.

It might be wet outside but we're home and dry with the hottest releases this week . . .

Shorts

If by any chance you ever considered rats to be really you will be truly disillusioned by the forthcoming video system game from Modder and Cambridge Software based on James Herben's novel of the same name. The Rat pits you against hordes of Roland's nasty creation who are trying to take over London. In a series of 16 adventures to which you take a number of roles your objective is to track down and eradicate the rats who are overrunning through the metropolis. The Rat will be available in September for the C64 and Spectrum price £9.95.

Rupert of course has never remained anyone and of 40 years old the venerable bear is making his software debut in Quackshot's Rupert and the Toy-maker's Party. It is the first of a series of Rupert releases proving that it's never too late for computer game fun. Rupert and the Toy-maker's Party for Spectrum and C64 will be in the shops at the end of August.

Assured adventures will be played on Lupo that Master of the Lounge is now available from Asterion. You have to be a master of the flying carpet to complete this game and use your travelled doublet craft to recover a stolen crown. There are no less than 20 levels to negotiate as your turbo-charged Asterion and a trio of goats to set you back. Price £9.95.

Aldrian Software have two new releases out now. Cope 'n' Kipling is all about, you guess, a Cope 'n' Robbers. Little Fingers Loozeng is something you may have seen but the police are on his trail. Fingers has to avoid the boys in blue and escape for his getaway car. For the Commodore and Vic 20, Cope 'n' Robbers costs £12.95.

Space Broom which is for the VIC 20, price £1.99 puts you in the role of a policeman leading off waves of alien attackers who are out to destroy your fleet of space-brooms. Don't show them ever take a day off!

If you happened to miss Hailys Comet on its last career 76 years ago, Edgemoor have a program that will make sure you spot it this time around. At £9.95 for the Spectrum, Hailys Comet II is devoted entirely to comet matters and will be a



must for astronomy buffs. Edgemoor are also releasing Astroblaze and Chemical Bombs for the Spectrum priced £8.95 and £9.95 respectively and more on what's happening up there as the firm moves with Stars and Planets on BBC B 24, with disc priced £7.95.

Imagine are following up their World Series Baseball game with World Series Baseball for the Spectrum. Available at the end of August, Baseball will be for one or two players using joystick or keyboard and will cost £7.95. An Amstrad version of the title will be available at a later date.

Shade are spreading the rumour that education can be fun with three multiprogrammes for the BBC entitled Fun Academy. The two disc pack, which includes 22 educational games for ages 8-15 costs £14.95, a suitable sum.

For Aster, Henry Bush, Hergrove, Chris Davies, Hedge of Wreck, Mowat Madsen are included in name but a few. Orpheus has announced that Elden is to be released on

the Amstrad. Previously only on the C64, Elden will cost £8.95. Another best seller now revised into Amstrad is Hyperquest a Wally from Microgen which is available now priced £9.95.

Finally Allegria have announced their releases for September. Hagger goes to Hollywood (C64 and Spectrum £7.95) Shoot Em Up, a spoof of everything, from up game ever made will be available for £7.95 with C64 and Atari versions back to back on one disc.

A game previously called Who Dares Wins is a pond through mazes and mazes arranged to mean battles. It will be for the C64 and retail at £7.95. Demolopagus, a game for split personalities as you can have two of yourself running around the screen will be for the Amstrad and costs £7.95.

Further ahead in October Allegria will release Quiz Quest for the Amstrad, Spectrum and BBC B all £4.95. Featuring hundreds of questions on general knowledge, Allegria believe it is ideal for the complete answer to Trivial Pursuit.

SOFTWARE



The Secret of St. Bride's

Finally, I had grave doubts about reviewing this. An adventure game set in a girls' boarding school didn't really seem likely to provide much compensation for the more "humane" type of game that is the norm among adventure observers, reviewers, and fans of things. However, I really quite enjoyed it once I started.

It seems that St. Bride's is a real, honest-to-goodness, old-fashioned girls' school in Ireland though there are no details in the instructions. I assume that this adventure was written by one or more of the pupils there. The plot sends you as Vivian Travers who is visiting the school on the present day but discovers that all the pupils and staff really believe they are living in the 1930's. Adventure and its real friends, *Cryptus* and *Frans*, you must make out the school's hidden secret and restore normality.

The game was written with and makes good use of. The *Quill* and *The Illustrator* by *Clough*. It's by no means perfect as there are a number of responses which, though quite understandable, are not correct for, in one location there are some stones "to the North, looking up", but through the command "Up" is accepted, "North" isn't. This is a fairly typical flaw, but even so, I found some of the problems quite funny, and the "jolly lolly cake" humour is really done just as playfully as it could have been.

Next, perhaps, is *come de la arena*, but a good effort and worth a second attempt. C.J.

Price £5.95

Publisher St Bride's School

Address: Berrisport, County Donegal, Ireland

SPECTRUM



3-D Voice Chess

You won't need the add-on speech generator for this program. It actually speaks its moves on the well-known chess co-ordinate system, though the quality is not good enough to distinguish the words without reading them from the screen too. Perhaps a bit of a gimmick, but an interesting and clever one.

The program also uses chess grammar, and a good comparison with the much vaunted *GL Chess* program, the whole board is shown in full 3-D, as are the pieces. Not just one view each, you can turn to view the board from any side, and the effect is just as convincing. All the pieces can be rotated too, so instead of sitting in front of glass, or on wooden pegs across, you can set up as you wish.

I played the computer against Masterchess on the Spectrum. Over three levels and over 200 hundred moves, the Amstrad

won once, the other two games were unfinished, though 3-D Voice Chess was surely closer to its responses. Its analysis made allows alteration of the board, and having set up a chess problem, a acquired itself well.

Another very commendable feature is the facility to save the program in disk. Other software houses take note. That's no clock, however, and only about three previous moves are displayed on the screen — that's not much more given to the 3-D. The first chess game I've seen where the standard of graphics matches the amount of work put into the game algorithm. Excellent. D.H.

Price £12.95

Publisher CP Software

Address: 16 Alexandra Road, Harrogate HG1 3JF

AMSTRAD





Rock Bold

Remember the old arcade game where you have to shoot at a screen full of rocks, flying causers and over more fanciful beasts, until they eventually beat you and your spaceship? Well this is the Amstrad version — but what a revision!

I wasn't impressed until I realised that the rocks which disappear as you shoots them, were in 3-D and rotated about two axes, not just round and round. Very classy. Mother was I too keen on the sound until the single voice tune stopped to be replaced by some very superior sound effects, explosions, laser noises and so on. Because even better on the graphics when screen two was eventually reached. The colours and enjoy advanced causers and almost made a really compelling movement is generally very smooth, but there is just a hint of flicker when scrolling, rotating, and exploding are all called for at once.

I was, however, impressed from the outset with user facilities, not only reduced keys, but also the facility to choose certain options. Thus you can choose smart bombs, or hyper-rays, or shields, or flaps, or reverse shots — you name it, in order to defeat your foe. One of the best demo modes yet seen accompanies a hi-score table that's not strictly impossible to pass.

For me, the welcome bonus prize and the sophisticated implementation made up for the lack of originality in concept. If you like shoot 'em ups, you'll flip. D.M.

Price: £5.95

Publisher: Koma

Address: 12 Hoxton Pl., Pangbourne, Berks



Dragons

Sorcery deservedly told us as graphics — the concept being a crowd of previous ideas — and I hope Dragons is as successful in any be ladders and levels but.

The screen is shown with platforms in the shape of 3-D clouds intercostated by mass of delicately drawn flowers, all in Mode 1's full colour. You control an equally well-conceived man who's task is to collect all the jewels. You must also jump off the dragons — sorry look, creatures of different colours, shaded to give a 3-D effect — but not with anything to credit as a reward!

Across the top of the screen the white Queen Dragon, majestically, and smoothly, floor lying 3-D rays which give to rest on various clouds. Guide your man to them, then gently push them off onto the minor dragons. But don't get caught yourself, or you'll lose a life. Kill the dragons and you're off to the next of 20 screens, though the colour choice for screen 2, which is as far as I went, could have been much better. The different colour of dragons portrays different attacking capabilities, so the game isn't easy, and they often change colour in response to your play.

What made this memorable for me, and for my random ocean of terror, were the amazingly charming graphics, the very beautiful screen music, and the sound effects. For us, the best ladders and levels graphics yet seen on the Amstrad. D.M.

Price: £5.95

Publisher: Amstrad

Address: Brookwood Hse, 109 Kemp Rd, Brookwood, Essex, C14 6EP



Valley of the Dead

You must rescue three explorers, who are trapped at the bottom of deep caverns, by travelling down each cavern in your hot air balloon. Each cavern takes up several screens.

Controls are left, right and boost, which temporarily increases foot height. As you are continuously falling — perhaps the balloon has sprung a leak — to travel horizontally it is necessary to use frequent short bursts of boost, but it is very difficult to maintain any desired height. There's no joystick option.

The speed depends on the height of the balloons at the caverns, which isn't a good measure of progress on many of the screens. The caverns are difficult to negotiate due to jagged edges and stalactites, stalagmites and moving objects which all must be avoided. You can choose which of the three caverns is simple, supposedly, easy, medium and hard, but I found them all extremely difficult. You also have the option of loading two other sets of caverns, but on my copy the program crashed while at the middle of loading them.

When selecting options, or starting, the boy responds in very slow, but so evasive, times being played which can't be tweaked off.

Although the task is to avoid the alien in a confined space an impossible degree of concentration and timing is required. This is a simple idea made very difficult and would soon to generous hours of frustration. S.J.R.

Price: 95p

Publisher: Pocket Money Software

Address: 360 Chesham House, 150 Regent St, London



Flipped



Hooked



Keen



Yawning





Devil's Descent

You are a fearless space commander who must rescue a fleet of night space ships by piloting your own through a cavern, known as the devil's descent, which is 40 screens deep.

Your ship is permanently falling so you can move left and right to avoid the numerous stationary obstacles and the various walls, in other words avoid everything that isn't black. — Henry Ford would have approved! In each direction you may move slowly or fast, if you press both keys you move very quickly, necessary if you are to negotiate the trickiest screens. However, this arrangement is very difficult to get the hand of — both in judging the correct speed and pressing the appropriate key. There is no joystick option.

When you have completed a descent you return to the start with a faster ship — an ship according to the instructions! There are also four skill levels which slightly affect the speed.

There is a demo mode, and you are given the welcome option of a training mode which allows you to practise on each screen.

Graphics are adequate, with many of the screens being repeated on different screens, but if you travel close to the edge of the screen, the ship's green outline disappears part at a time, leaving behind a trail of green dots.

Devil's Descent is just a decent game and I doubt it will appeal for long although it is very cheap. I would recommend saving up to buy a more interesting game. S.J.E.

Price: 99p

Publisher: Pocket Money Software

Address: 300 Chiswick Hts, 150 Ryepond St, London



Highway Encounter

From the author of T.L., comes the latest of Vortex's 3-D shoot-em-ups. Once again the humble player is car's last hope. All that stands between the player and work domination is a highway. You must travel down 30 screens of this road, tapping the various drops trying to stop you, until you reach their stronghold, zone zero. There you need to pass the laserline, the world's most powerful weapon, and then save the world.

You control a car, which is a plain type shell and one novel feature is that your back up level are also on screen — their task is to shoot the laserline across a central path, which you must clear for them. They can be destroyed independently of you, so you have to protect your future lives as well as the present one! The back up vehicles have no intelligence and move along at constant speed until something blocks their way.

Graphically, Highway Encounter is superb. The main screen is in Knight Like style 3-D, satisfactorily animated. Another similarity to Knight Like is the way obstacles like barrels and bricks can be pushed — as even this is about. There are some good, colourful background scenery graphics, particularly the bridges based in variable motion.

As in most games that a battles, lots of shots to shoot, with a reasonably challenging and dense of steel adversary. I think it's a little overdone, however, and I found the onscreen instructions too brief, although the program has good onscreen instructions and a useful demo. It also has some loading difficulties and had to be on my system! Generally a polished product which should be well received by the arcade addict. S.J.E.

Price: £3.95

Publisher: Vortex

Address: Vortex Hts, 24 Kenzie Av, South Langworthy Rd, Salford M5 3QJ.



Bronx Bluff

A commendation of one of my Spectrum favourites of last year which never got the attention it deserved, Bronx Bluff entry you in the role of someone of the three machines on a mission to the planet Pluton.

Your mission has six phases. First you must lower one of orbit and guide your craft to the surface on the planet using a guidance system and radio rockets. If you don't score high enough, it's back to the beginning. On arrival with the following phases where you must take the cover vehicle, then pilot it through a swamp, a ruined city and a desert while shooting attacking monsters, and finally, take over the surface of an ocean, avoiding rocks and the base ship is based. Talk too long though, and the crew the before you can get to them.

Player facilities are very full, keys can be redefined, and your game position can be saved not only to tape, but into memory, to be recalled when you boot the next time, so you don't have to go back to the beginning. Well done Microgames.

Score sound is good, but the 3-D graphics which is impressive on the Spectrum don't seem to have been composed any for the more sophisticated screen and are beginning to show their age now, though the game still seems easy to play.

Even so, I find this very addictive, interesting and enjoyable, though a little over priced. D.M.

Price: £3.95

Publisher: Amsoft

Address: Rosewood Hts, 168 Ryepond St, South Langworthy Rd, Salford M5 3QJ.



War Zone

War Zone is a computer war game of a battlefield, but unlike many similar programs, it is set in a defined landscape or geographical area. Indeed I like the fact that in each game a slightly different terrain is drawn, with the user freedom of hills, mountains, woodland and roads, but distributed randomly. The player raises the blue army, consisting of tanks, artillery and infantry, selecting any combination required between a total of 15 and 250 pieces. The computer takes an equal number, and distributes the figure for the start of action, which takes the form of alternate turns.

The battlefield is a 3 x 3 grid, and the player can view any square in which blue troops are present. The range of available commands is easy to remember, and includes moving, troops, firing from one square to another, and even asking for an aerial view on every piece, always within certain constraints of range etc. Troops moving to adjacent squares indicate in hand-to-hand combat, with occasional surprise results. The player's surviving pieces are clearly displayed, but I often wanted to know the current strength of the opposing army, and my computer wouldn't tell me!

The computer plays a copy and strong game, and a war is long while before I could celebrate victory. On many occasions, I felt the computer almost called for a draw when remembered. The graphics are designed for clarity rather than spectacular effect, but the prompt keyboard response and challenging nature of the game made it a winner for me. P.T.

Price: £6.95

Publisher: C.C.S. Ltd

Address: 14 Langton Way, London SE8 3TL



BLUE RIBBON



Castle Assault

A glancing reward awaits the strategy who reach the top of the heavily defended towering garrisons of this forbidding fortress. On your quest for gold, you will be assailed by menacing orcs, goblins, hobgoblins, ogres, huge and terrible. Watch out for the deadly flying disk and avoid the falling rocks, and so the pressure on the map card goes on. Unlike many castle bluffs, this one actually depicts the game rather well.

Usually you command a very well armoured multi-coloured character who jumps over the bouncing enemies and sometimes platforms in order to get to the top of the screen whilst avoiding falling rocks and the deadly flying disk.

The graphics in this game are very good. The characters move smoothly and quickly without disturbing the detailed background graphics — good enough to make you think the B&B had hardware spies! The characters themselves are colourful and well defined. The sound effects are also well done, especially the sounds of the flying disk which loudly crashes across the screen flapping its wings! All the usual extra features such as freeze, sound on/off, full of fame and a most life gauge, too these.

The game is fun, challenging and professionally presented. It may not be quite up to the standard of some of the recent Atariwits, Imagines and Ultimate releases but what gives this game its ring is its price. A first class game sold at the price of a budget game, but don't forget, the game was originally available from kiddie software. **B.S.**

Price £2.95

Publisher: Blue Ribbon Software

Address: Silver Mile, Silver St, Dagenham, 3 York

BBC



Big Alley Ace

At last, U.S. Gold have introduced this old Monopoly classic. Set in the Korean war, you are locked in deadly combat with Chinese-built fighter planes. Five scenarios can be chosen from or run together to form an ongoing campaign, and there are three levels of play.

Although this is no Solitaire flight simulator, all basic flight information needed is presented on screens — speed, altitude, ammo, power and a rear mirror.

The cockpit view is superior — blue square sky and green ground, control is by joystick with throttle and gas pedal manipulated by keyboard — the latter is essential when playing the computer.

The joy of this game is that you can play the computer, or a friend. It is "Pokein II", the screen is split into upper and lower halves, each showing the view from a respective cockpit. Honor the enemy can see your plane diving away into the distance.

There is an auto-aim option to allow one player to act in scenes against one or two computer pilots — this is useful, with the computer playing a mean opponent, especially on higher levels. Inevitably some provided with the game are cancer and easy to read.

The split screen system works well and depicts the obvious dimensions of the graphics, in a fun game to play. Overall this is a good addition to any other collection, although a little overpriced. Not as enjoyable as B&B's Banker Eagle, but the two-player mode compensates for its simplicity. **B.C.**

Price: £9.95

Publisher: U.S. Gold

Address: Unit 18, The Parkway Ind Centre, Hodge Street, Birmingham

ATARI



Beach-Head

At last the flow of good American software imported by U.S. Gold reached the B&B! After months of mouth-watering ads in the computer press for classic Gold games, comes this reasonably good implementation of the 64 games for the BBC. Not before time.

The story is also enough — land troops on a beach-head and then advance to defeat "the doctor" at his fortress. If rumors of the game's solid system have reached you then the very long loading time won't faze you and once past it you're into a multi-screen, 3-D, nippy sound, multi-shall level and strictly computer game that is competitive enough to keep you attacking until the early hours.

First, you have to decide whether to go for a straight frontal assault or try a sneaky beach and slide through the secret passages. The frontal approach is a carry but you then have to do more work later, the passage is a separate screen where you have to manoeuvre your ship past mines and ice-potatoes. It's worth the effort, though, as the next stage (Colonel Quarter's) consists of more about nine of planes attacking however many ships you've managed to sneak through. If you've been comically and taken the frontal route, then you have to shoot down the enemy planes.

The system is a lot of pressure to blast from the shore and the best tip is to move your ship slowly and be the player to also the enemy of his land — if you shoot them up and down the sky you'll find the best time to wipe you. Attack

ing you survive the planes, you and have to wait at aerial bombardment — the screen doesn't change but the enemy ships start shooting. Before then, too delayed by "short" or "long" messages and you move your command to the aerial beach-head.

Load your tanks and drive through the defense system until the first hurdle — the attack on Kuhn-Lan fortress. Having only 10 shots, you must destroy the fortress making every shot count — there are 10 targets but only one appears at a time. Well, you'll feel the need for more as the fortress returns every minute.

All in all, an excellent game. While some may question the morality of such unfeeling pursuit to brutality and machine adventures, the truth is the game's and is that it is well-designed, competitive and a good value. The loss of quality from the Commodore original is minimal and with the numerous scenarios it offers a range of games for the price of one.

What more can I say? I've got seen Beach-Head II for the Gold and it's even better — how long, U.S. Gold? How long? **B.B.**

Price: £9.95

Publisher: U.S. Gold

Address: Unit 18, The Parkway Ind. Centre, Hodge Street, Birmingham B7 4LT

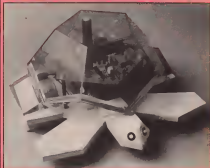
BBC





PERIPHERAL

Margaret and Allen Webb explain why the Valiant Turtle/Commodore Logo package is both educational and fun to use



The package actually comprises two items. The system is Commodore's Logo package which is used to drive the Valiant Turtle.

Before attempting to describe the performance of these items, it is best if we discuss the value of the system. Logo is a language which was developed specifically to aid the teaching of programming to young children. The designers realised the value of visual aids to education and built the system around a turtle which creeps around a graphics screen. At this point we must add that Logo also has excellent text handling facilities and simple mathematical routines.

To the BASIC user, Logo will appear to be a fairly odd 'beastie' on Floppy. Logo allows you to write your own programs as lists of fundamental sub-built functions or primitives. Such procedures are called by name and can be used by other functions. Structurally this can be compared to an onion —

with primitives in the middle and subsequent procedures as layers. A particularly powerful feature of the ability of procedures to actually call themselves increases the exact phrase! Rather than tying the machine to a book, this capability allows the creation of both elegant and powerful programs.

The best known feature of Logo is the ability to move the turtle by simple commands such as FORWARD, LEFTTURN and RIGHTTURN. Using such primitives, it is simple for a child to develop drawing routines.

The Logo comes on two discs with a huge instructions manual. One disc sample holds the language and the second holds a collection of demonstrations and utility routines. The demonstrations are fairly impressive showing many of the features of the language, a particularly striking example of which is a simple adventure which functions quite efficiently.

by. Utilities include a suite of routines for drawing arcs and an assembler.

The Commodore Logo has a number of additions to offer for the special features of the C64. Sprays, sound control and multicolour plotting are all supported. The manual is a joy to use being comprehensive with lots of projects and examples to try out. The book is A5 size and was nearly as thick. Great value!

Commodore Logo

Price £14.95

Publisher: Commodore Business Machines

Address: 1 Hunter Rd, Welling, Croydon, Northants

C64





The Valiant Turtle is a robot which can be controlled by the computer. No programming is needed; it looks roughly like a turtle and has a green clear plastic shell. It has two driving wheels and a single ball joint in a manner similar to tanks. Movement is controlled by driving the wheels in either direction. No wires are needed since the turtle is driven by infrared remote control. The control unit plugs into the computer's serial port and is powered by mains.

On unpacking, the first job is to give the turtle 16 hours of charging. You'll know when it's

ready to go when its eyes glow red. After connecting up the control unit and plugging the pen into the turtle, load Logo and you're ready to start. A disc with the turtle provides the necessary patch into the Logo. The setting up of the system is simple and generally without problems.

Once it's going, any of your programs will drive the turtle and draw pictures on a sheet of paper. One problem is the scale factor between the screen and the turtle. A small move on the screen turtle moves the robot quite a distance. The first time

we tried it, the turtle drew off the paper and drew a grass line on our carpet!

As you may have noticed, the Valiant Turtle isn't cheap and we feel that its main area of use will be in schools. The movements of the turtle under command referenced our son who gave up quite of delight each time it moved. The support is still to be a bit weak, however.

Even if you can't afford the hardware the software package is an excellent mechanism in itself. The command structure is such that it is simple, even

for the computer beginner, to develop interesting routines and impressive drawings. Overall, a commendable product.

M.W.

A.W.

Valiant Turtle

Price: £199.00

Manufacturer: Valiant Designs

Address: Park, Box, 140 Buxton, 101 Pk. Rd., London SW19 4NH

054



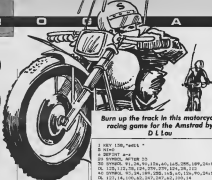
COMING SOON

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MIKRO-PIES

PEED KINGS



Burn up the track in this motorcycle racing game for the Amstrad by D. J. Lou

Two wheeled speed breaks can run to their hearts content in this running track simulation. The game can be played as a two handed or you can opt to turn rubber on the computer controlled side.

1100

183 playing score
 184 number of games won by
 185 player 2
 186 number of games won by
 187 player 1
 188 player 2's score
 189 player 1's score
 190 situation of player 1
 191 situation of player 2
 192 PB an opponent of player 1
 193 PF co-opponent of player 1
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Age Group	Total (%)	Male (%)	Female (%)	Unknown (%)
18-24	12.5	11.8	13.2	12.0
25-34	28.3	27.5	29.1	28.0
35-44	22.1	21.5	22.8	22.0
45-54	18.7	18.2	19.4	18.5
55-64	14.2	13.8	14.6	14.0
65+	5.2	5.0	5.4	5.1

0000-0100	uninitialized
0001-0004	player home screen
0005-0008	game loop
0009-000A	up (player 1)
000B-000C	right
000D-000E	down
000F-0010	left
0011-0014	up (player 2)
0015-0016	right
0017-0018	down
0019-001A	left
001B-001C	computer movements
001D-001E	and choosing
001F-0020	results for player 1's
0021-0022	strategy
0023-0024	results for player 1's
0025-0026	strategy
0027-0028	end of game screen,
0029-002A	including choosing options
002B-002C	screen state
002D-002E	idle
002F-0030	moving player 1's
0031-0032	classroom

[illegible]

BRIGHT SPRITES



More tips on personifying your sprites to spring into life in part four of Andrew Clarke's programming series for the C64

Ammenon is possibly one of the most feared names of character designers and therefore most games published in magazines feature a main character that visitors around the screen but don't see, move and spritely wander. These main characters are responsive and take any report that a game might have.

Animate sprites is fairly easy to do. The harder part is creating the sprite picture — the "frames" you will see. Once that is done, then the rest is well, easy! The process works in much the same way as a flick camera, where pictures are displayed one at a time and are drawn so as to deceive the eye into thinking it is watching actual movement.

With sprites you can keep it very simple or go into great detail. One of the best examples of watching games on a sprite is in Williams's *Ball of Lure*. This main character moves so smoothly that it is almost impossible to see that it is made of eight sprite pictures that he used to create the illusion that it is only one character.

We don't need to go to such lengths. Two frames might not suffice to get a walking action, although it won't be too satisfying. Before we go any further it has to be said that animation is not just restricted to little men running about. Think of the acrobatics in *Beach Head* and *Demolition* as they zoom in at you. The same principle of "frames" is used there — first a small plane then one slightly larger and so on until you reach full size.

When part of routine do you use for the drawing of your plane? The following routine will show you a rather special way. Firstly the cursor key below the ship explodes will show you another possible way of animation.

When I expect here is that in Frames (in an area of sprite data) are used. Here is a routine:

```

1 ship normal data block 200
2 ship heading data block 201
3 explosion pt data block 202
4 explosion pt data block 203
5 explosion pt data block 204
6 explosion pt data block 205

```

The ship is originally brought in as Frame 0. Pressing the cursor key below the ship goes to Frame 2 by reading the sprite pointer (location 204) from data block 200 to 204. Pressing remote flags returns back to Frame 1 (data block 200).

When it reaches a certain point on the screen the ship explodes. The sprite pointer is incremented through blocks 202 to 204, only meaning it controls a delay POKE. NEXT loop. The sprites at 202 to 204 are defined in such a way as to appear to be an expanding field of particles — draw at first, then clearing out.

Here we used a POKE NEXT loop to control the sprite data but that won't be much use when trying to use a "walk" routine. To control for random movement we need use a variable which can be POKE'd into the sprite pointer location and can be incremented or decremented as we did with sprite movement in article two.

Let us say that the three sprites used in a walk sequence are at blocks 200 to 202 and for moving right they are at 203 to 205 and "frames" in all. If the routine is called 2, then for walking left 2 will first equal 200 then 201 and finally 202. This sequence may be repeated depending on how you have arranged the data. You may find it best to go straight back to 200 or go back through 203 then down to 200 and then back up again.

Each time 2 is increased or decreased you must use IF THEN statements to check its status, so that it doesn't go over 202 or below 200. Once checked you can POKE the value into location 204 for sprite zero, or 204 for sprite one and so on.

When the player changes direction then 2 must be made to equal 203 for moving right and a similar process is repeated. A small routine to change 2 might be useful and could look like this:

```

1000 IF 2 = 200 THEN 2 = 201
      RETURN
1001 IF 2 = 201 THEN 2 = 202
      RETURN
1002 IF 2 = 202 THEN 2 = 203
      RETURN

```

A similar routine is needed for moving left.

The main program will move these characters through the map input. For example, if you see a joystick and push left then make a variable, say, A equal 1. If a game right then A will equal 2 and if there is no joystick connected then A equals zero.

Then within the main program another routine would say IF A = 1 THEN LOC(201) = 000 and if A equals two then another routine would add it to the appropriate address. For zero (no movement) it does nothing — then stops the character appearing to "live on the spot".

This all seems fine if the joystick moves left then A will equal one and you should LOC(201) = 000, the routine at loc 1000 to 1004. But how does the computer know what 2 equals?

At the start of a program you may make 2 equal an appropriate value but it is of no use here. Think about it. After the IF THEN statement which controls the joystick input you have: A = 1-2 = 200. Okay? ... Wrong! [1]

With a statement like that each time you push the stick left Z will be made equal to 200. Therefore the routine at least 1000 to 1004 is wasted. To modify the problem you need something that will make Z=200 only when the joystick is first pushed left. Afterwards a flag must be ignored. The good old IF THEN statement comes to the rescue.

The way to say it is to use the after getting the stick signal and making A=1:

```
IFZ<200THENZ=200 for the
  (the other way)
IF Z<200THENZ=200
```

What this does (taking the first example) is to say that if Z is

larger than 200 — therefore the character was previously facing right — make it equal 200, that is the first "frame" in the left facing walking sequence.

But if it isn't larger than 200 it is already facing left and you shouldn't make it equal 200 again. This may sound complicated but try a similar routine yourself and you'll see how these methods solve the problems which you encounter.

The design of a sequence is also easier than you may have thought. Artists may have an advantage here but we more artists get there in the end.

First design your "master" sprite character. This will be the character in several poses — as the case of a hero man he will

probably be facing left with his legs together.

Then design a sprite that is identical to the first. Now pretend it is so that a leg is moved so we can recognize the second as a third identical to the second then also this so that another step to the animation sequence is completed. Continue the process for as many as you need it helps if, in a walking sequence, the feet appear like a natural progression back to the first so that if required they could be run in a FOR...NEXT loop endlessly.

Now you need a set for facing the other way and for jumping, climbing, dying and talking (some sprites couldn't allow you

to "marry" previously created sprites). The less fortunate amongst us have to slog a copy.

Finally I will leave you with a program that shows three different poses of animation. One shows a small beginning series of three squares. The next uses just two sprites to make a dog seem to run (this is from my GOLF program in HCW issue 100). The last one also uses just two sprites to show a hopping fly. The golden rule here is keep it simple.

Extend the large amount of data to type as — that's one of the perks of animation. More and more in the final part of my series. Then I'll be doing you how to deal with the sprite collision detection routines.

```
0 REM ***** PROGRAM ONE
1 REM ***** AN EXPLOSION IN SPACE
2 REM ***** READ IN DATA
10 FOR%200TO255:DATA=87062
12 READ%POKE%64+T,R:NEXT NEXT
13 REM *** SET UP SPRITE ZERO + SCREEN
14 V=32240:PRINT"R" POKEV+20:0
16 POKEV+32:0 POKEV+33:0
18 POKE240,200 POKEV+21,1
20 POKEV+1,150 POKEV+33,1
21 REM *** MOVE SPRITE
22 FOR%8706250STEP,5
24 POKEV,X
25 REM *** CHECK FOR USER INPUT
26 GET%:IF%=""THEN%12
28 IF%="R"THENPOKE240,200
30 IF%="E"THENPOKE240,201
32 NEXT
33 REM *** EXPAND AND EXPLODE SHIP
34 POKEV+25,1
36 FOR%200TO255:POKE240+2
38 FOR%1TO255:NEXT NEXT
39 REM *** ANOTHER DOT
40 PRINT"*****EXPLOSION? (Y/N)"
42 GET%
44 IF%=""V=255:RUN14
46 GOTO42
99 REM ***** SHIP 1
100 DATA0,0,0,120,0,0,192,0
102 DATA0,224,0,0,112,0,56,120
104 DATA0,60,32,0,120,70,121,1
106 DATA79,255,207,79,255,255,70,236
108 DATA120,92,104,32,120,240,0,115
110 DATA224,0,224,0,0,192,0,0
112 DATA120,0,0,0,0,0,0,0
114 DATA0,0,0,0,0,0,0,0
115 REM ***** SHIP 1
116 DATA15,120,0,129,192,0,192,224
118 DATA0,224,224,56,240,104,60,80
120 DATA22,130,76,235,1,79,255,199
122 DATA79,255,255,76,235,240,0,230
124 DATA96,240,104,0,224,224,0,192
126 DATA224,0,129,192,0,15,120,0
128 DATA0,0,0,0,0,0,0,0
130 DATA0,0,0,0,0,0,0,0
131 REM ***** EXPLOSION 1
```

```
132 DATA4,2,0,64,4,0,33,0
134 DATA16,16,0,32,2,34,0,33
136 DATA36,16,16,160,32,0,112,64
138 DATA3,255,0,0,112,64,16,160
140 DATA32,33,36,16,2,34,0,16
142 DATA9,32,33,0,16,63,2,0
144 DATA2,1,0,4,0,120,0,0
146 DATA0,0,0,0,0,0,0,0
147 REM ***** EXPLOSION 2
148 DATA129,0,17,64,0,2,32,16
150 DATA4,16,0,0,0,123,16,120
152 DATA6,0,0,36,16,4,0,32
154 DATA2,60,66,1,0,100,126,0
156 DATA16,1,0,120,2,16,64,4
158 DATA0,34,0,120,16,123,17,0
160 DATA0,0,16,16,0,0,40,64
162 DATA0,64,0,2,120,4,1
163 REM ***** EXPLOSION 3
164 DATA4,16,0,0,0,0,0,0
166 DATA0,4,0,0,0,0,1,0
168 DATA0,0,120,132,0,0,0,16
170 DATA0,0,0,0,0,0,0,1
172 DATA0,4,32,1,0,0,0,0
174 DATA4,0,0,0,0,120,0,16
176 DATA0,120,0,0,0,1,0,0
178 DATA0,0,0,0,120,129,4
179 REM ***** EXPLOSION 4
180 DATA0,0,2,0,0,0,0,0
182 DATA0,0,0,16,0,0,0,0
184 DATA0,0,0,0,0,0,0,0
186 DATA0,0,0,0,0,0,0,0
188 DATA0,0,0,32,0,0,0,0
190 DATA0,0,0,0,0,2,0,0
192 DATA0,0,0,0,0,0,0,0
194 DATA0,0,0,0,120,0,16
```

```
0 REM ***** PROGRAM TWO
1 REM ***** EXAMPLES OF ADDITION
2 REM ***** READ IN SPRITE DATA
10 FOR%200TO255:DATA=87062
12 READ%POKE%64+T,R:NEXT NEXT
13 REM *** SET UP SCREEN AND MENU
14 V=32240:PRINT"R"
16 POKEV+33,0 POKEV+33,0
18 PRINT"*****EXPLOSION"*
```

```

20 PRINT"#####"
22 PRINT"#####PRESS KEY (1 - 3)M"
24 PRINT"#####1.  WTHE EYE BOOGLER"
26 PRINT"#####2.  WMD DOG"
28 PRINT"#####3.  WTHE FLY"
30 GET# 1:IF#=""THEN:GOTO30
32 IF#="1"THEN:GOTO40
34 IF#="2"THEN:GOTO60
36 IF#="3"THEN:GOTO70
38 GOTO30
39 REM *** THE EYE BOOGLER
40 PRINT"?" POKEY+1,100 POKEY,100
42 POKEY+20,0 POKEY+20,1 POKEY+20,1
44 POKEY+20,1 POKEY+21,1
46 FOR#:=1TO20
48 FOR#:=20TO200 POKEY+20,2
50 FOR#:=1TO100 NEXT NEXT
52 NEXT POKEY+21,0 GOTO14
53 REM *** WMD DOG
54 PRINT"?" POKEY+1,100 POKEY,100
56 POKEY+20,1 POKEY+20,1 POKEY+20,1
58 POKEY+20,1 POKEY+21,1 POKEY+21,7
60 FOR#:=1TO20 FOR#:=20TO200
62 POKEY+20,2 FOR#:=1TO100
64 NEXT NEXT NEXT
66 POKEY+21,0 GOTO14
67 REM *** THE FLY
68 PRINT"?" POKEY+1,100 POKEY,100
70 POKEY+20,1 POKEY+20,1 POKEY+20,1
72 POKEY+20,1 POKEY+21,1 POKEY+21,7
74 FOR#:=1TO20 FOR#:=1TO100
76 POKEY+20,2 FOR#:=1TO100 NEXT
78 POKEY+20,2 FOR#:=1TO100 NEXT NEXT
80 POKEY+21,0 GOTO14
81 REM *** SPRITE DATA
82 DATA255,255,255,128,0,1,128,0
84 DATA1,159,255,245,144,0,3,144
86 DATA0,0,147,255,201,146,0,73
88 DATA146,0,73,146,136,73,146,66
90 DATA79,146,126,73,146,0,73,146
92 DATA0,73,147,255,201,144,0,0
94 DATA144,0,0,159,255,245,128,0

```

```

114 DATA1,128,0,1,255,255,255
115 REM #####
116 DATA0,0,0,127,255,254,64,0
118 DATA2,64,0,2,79,255,242,72
120 DATA0,10,72,0,10,73,255,146
122 DATA73,0,146,73,0,146,73,60
124 DATA146,73,0,146,73,0,146,73
126 DATA255,146,72,0,10,72,0,10
128 DATA79,255,242,64,0,2,64,0
130 DATA2,127,255,254,0,0,0
131 REM #####
132 DATA0,0,0,0,0,0,63,255
134 DATA252,32,0,4,32,0,4,30
136 DATA255,255,36,0,36,36,0,36
138 DATA36,255,36,36,129,36,36,129
140 DATA36,36,129,36,36,255,36,36
142 DATA0,36,36,0,36,39,255,220
144 DATA32,0,4,32,0,4,63,255
146 DATA252,0,0,0,0,0,0,0
147 REM #####
148 DATA0,0,0,0,0,0,0,0,0,0,0,0
150 DATA0,0,64,16,1,0,0,0,4,0,0,0,0,0,0
152 DATA21,0,0,21,0,0,64,0,0,0,0,64,0
154 DATA0,0,0,120,0,0,0,160,0,160,42
156 DATA170,170,2,170,160,0,0
158 DATA160,0,0,32,0,0,0,0
159 REM #####
160 DATA0,0,0,0,0,0,0,0,0,0,0,0
162 DATA0,64,2,16,16,0,0,4,0,0,0,0,0,0
164 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0
166 DATA0,0,0,0,0,0,2,120,0,16,2,120
168 DATA0,170,170,2,170,160,0,0
170 DATA0,0,0,0,32,0,0,0,0
171 REM #####
172 DATA0,0,0,0,0,0,21,0,0,21,64,0,0
174 DATA0,0,1,0,2,2,0,0,10,42,0,0,40
176 DATA170,170,164,170,170,160,160
178 DATA255,160,0,255,32,240,195,0,0
180 DATA237,2,0,0,0,0,0,0,0,0,0,0,0,0,0
182 DATA0,0,0,0,0,0,0,0
184 REM #####
185 REM #####
186 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
188 DATA0,0,0,2,10,40,10,42,0,0,40,160
190 DATA0,164,160,30,160,101,31,160
192 DATA21,167,32,213,150,0,0,237,0,0
194 DATA2,0,0,0,0,0,0,0,0,0,0,0,0,0,0
196 DATA0,0,0,0
197 REM ##### END

```



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IT'S A GAME



*Red and Yellow and Pink and Green,
Orange and Purple and Blue, we can
draw a rainbow and so can you! Dave
Ellis continues his game writing tips*

In the first article we looked at colors in the text mode.

The same colors that are used for the text are also used for the graphics; the number of colors available depending upon the current MODE.

You may be interested to know that it is possible to double the number of PENS available in each mode by using software changes in the frame flybook. The screen and the border area can be split and have two different colour palettes. The technique is too complex to discuss in more detail here — but it can be done. Next time you get a MODE 1 screen displaying eight different colours for example, you'll know why!

To experiment with the graphics colours, first reset the machine and then set up two windows with

```
WINDOW #1,1,17,1,25
COLOR# 128,128,128,640,640,
128
```

Now clear the text window to

BRIGHT RED with

PAPER 3:CLS

The smaller graphics window is cleared to BRIGHT RED by

CLG:3

To select a PEN for drawing a line, the PEN number is added to the end of the drawing co-ordinates. To draw a line in bright cyan (PEN 2) you would say

DRAW 100,100,1

This will draw a line from the current graphics cursor at 100,100 to the co-ordinates 130 = 100, and 200 = 100. In effect, the lower left hand corner of the graphics window should be thought of as being 0,0.

Now, if you wish to print some text at the graphics cursor use the TAG contained at

TAG:PRINT"GRAPHICS"

The word "GRAPHICS" will be printed at the current graphics PEN, which at the moment is bright cyan. Note that the text is printed with the cursor at the top left of the first letter, and that after printing the text the cursor moves to the end of the text — this can be demonstrated by using DRAW R 0,50 which will show the position of the cursor. Note also that a semi-colon must be used at the end of the text to be printed, otherwise you will end up with the symbols for the ENTER key and the line feed.

When if you wish to change the colour of the text that is printed? First type CLG to clear the graphics window. Then type

```
COLOR# 128,64:TAG:PRINT"ONE"
```

"ONE" will be printed in bright cyan. Now enter

```
DRAW 100,100:TAG:PRINT"TWO"
```

DRAW 0,0,1 sets the PEN to 1 (bright yellow). The single pixel that is drawn will disappear when the word "TWO" is drawn.

This is one way of changing the colour of text printed at the graphics cursor. There are other methods, but we mention code is shown in my BASIC notes and another by using a PORE which will be looked at shortly.

Setting the background PAPER of the graphics window is not so easy, unless you just wish to clear the whole screen as shown earlier. One method is to create a graphics window outside of the normal range, clear it with the background colour required, and then move the graphics window back to its previous setting. The difficulty here is that a small pixel of colour is displayed at the current corner of the screen in this method is not really very satisfactory.

Fortunately, there is a simple method of setting both the PEN and PAPER for the graphics.

PEN	MODE 2	MODE 1	MODE 0
0	0	0	0
1	255	240	192
2	0	15	12
3	255	255	204
4	0	0	48
5	255	240	240
6	0	15	40
7	255	255	252
8	0	0	3
9	255	240	195
10	0	15	15
11	255	255	207
12	0	0	51
13	255	240	243
14	0	15	63
15	255	255	255

DEFAULT INK VALUES for 80329

comes from BASIC by using some POREs. This also has the advantage of allowing some unusual colour mixes which are not easily obtained by other means.

The present settings for the Graphics PEN and PAPER are held at locations 48328 and 48329 respectively. The chart **DEFAULT INK VALUES** for 48329 shows what numbers are used for the various modes to hold the information on the current PEN values. The numbers may not be what you would expect, but that is because of the way that the pixels are encoded. Full details are given in the Forum's Manual — page 6-4, but only if you are interested!

Let's give it a try then. Enter the following:

```
CLG 3: ORIGIN 32,308:
DRAW 0,0,1
TAG: PRINT "ONE";
PORE 48329,15
TAG: PRINT "TWO";
```

This will print yellow text on a blue background in the graphics screen. How try?

```
ORIGIN 0,0: PORE 48329,
240
TAG: PRINT "THREE";
```

This time the text is red on a yellow background. Simple, isn't it?

You could have used PORE 48328,240 and PORE 48329,17 instead of the two DRAW commands if you so wish.

Now try to CLG 3 to get back to a clear RED graphics screen. Try

```
PORE 48329,100: CLG
```

You should get a striped RED/YELLOW background. Try the value 120 instead of 100 and you will get a RED striped background. The value 255 will give you a CYAN/RED/YELLOW/YELLOW striped effect. To see what other values occur try the following short program.

```
10 FOR X = 0 TO 255
20 PORE 48329,X
30 CLG: PRINT X
40 WHILE INKEYS=""
50 WEND
60 NEXT X
```

RUN the program, pressing any key to change the graphics window to the next value. Some very interesting patterns are created. You may better effects try it in MODE 0 by adding the following line to the above program.

```
5 MODE 0: ORIGIN 32,308:
328,440,480,328
```

Here how the mixing of colours produces different shades, and in some cases some very nice Moiré effects. Don't forget that different values can be added into 48328 to create dotted and striped backgrounds of different colours, and give some very interesting looking text!

The mixing of colours is known as dithering. I have included the program **COLOUR STIPPLING** for you to experiment with. This sets up three commonly used stipple patterns. You can see what the result of stippling various colours produces. All you have to do is to press keys 1 to 4 to change the various colours.

In the first article the DRAW command will be looked at in more detail and you will see how to start creating a Moiré of commonly drawn shapes which can then be enlarged to any size and also rotated through any angle.

```
10 SYMBOL AFTER 240:MODE 1:CALL BRDC2
20 SYMBOL 240,255,0,0,255,0,255,0
30 SYMBOL 241,170,170,170,170,170,170,170
40 WINDOW #2,0,0,10,24:WINDOW #3,0,14,10,24
50 WINDOW #4,17,22,10,24:WINDOW #5,25,30,10,24
60 WINDOW #6,33,34,10,24:bor=0:back=0:fore=1
70 FOR x=2 TO 5:PAPER #x,2:PEN #x,3:CLS #x:NEXT
80 PAPER #6,3
90 DATA 241,240,307
100 FOR x=2 TO 4:READ a:b
110 FOR y=1 TO 15:PRINT #x,STRINGS(b,a/y);NEXT y,x
120 PRINT "KEY 1 - Border colour = ";
130 PRINT "KEY 2 - Background col = ";
140 PRINT "KEY 3 - Foreground col = ";
150 PRINT "KEY 4 - Pen Colour = ";LOCATE 1,8
160 PRINT "----KEY 1----KEY 2----KEY 3----BACK----FORE--"
170 WHILE -1
180 IF INKEY(13)<0-1 THEN GOSUB 1000
190 IF INKEY(14)<0-1 THEN GOSUB 2000
200 IF INKEY(5)<0-1 THEN GOSUB 3000
210 IF INKEY(20)<0-1 THEN GOSUB 4000
220 WEND
1000 REM***** BORDER COLOR *****
1010 bor=bor+1:IF bor=27 THEN bor=0
1020 BORDER bor:LOCATE 25,1:PRINT bor:RETURN
2000 REM***** BACKGROUND COLOR *****
2010 back=back+1:IF back=27 THEN back=0
2020 INK 2,back:LOCATE 25,2:PRINT back:RETURN
3000 REM***** FOREGROUND COLOR *****
3010 fore=fore+1:IF fore=27 THEN fore=0
3020 INK 3,fore:CLS #6:LOCATE 25,3:PRINT fore:RETURN
4000 REM***** PEN COLOUR *****
4010 pencol=pencol+1:IF pencol=27 THEN pencol=0
4020 INK 1,pencol:LOCATE 25,4:PRINT pencol:RETURN
```

RON COMPLEX



Ron Complex, the man with no past and possibly no future discovers an even greater menace to computers — the RCWG

“Okey, but what’s your name and what’s your game?”

“I’m Ron Retina — hacker to the gentry. My card.”

Ron peered at the mousy offering in his hand and the words came into focus — “Ron Retina — Eyes in Every System.”

“Look, but this tells me nothing. As far as I can see a hacker’s a guy with a bad cough — that’s not much to build a business on.”

“Where have you been? There are people who’ll pay big money to gain access to classified files — that’s hacking.”

“I get that, but I still don’t see where the money comes in. Anyway what’s your angle? Why do you want to help me get the bugaboos?”

Ron shifted uncomfortably from one foot to the other. The details were slowly filtering to him into a recognizable tale and water trickled down the lenses of his thick plastic glass spectacles.

“The bugs are just the beginning. The rumors on the street is that the Etrian Club are about to announce the ultimate disruption of computer systems, something that will put the computer industry and the hackers totally out of

business.”

“Let’s walk, the pavement is no place for carthastrophes, revolutions,” said Ron.

Ron and Rex walked off down the street, their receding figures watched by the grizzled face of Captain Conservative, standing in the doorway of the Woolfitt and his.

The Captain scratched his head and his pawed behind the night air with his familiar cack. “Gosh the Captain. Gosh the Captain. Every day original. Ark! Disc drive must be dodgy. Disc drive must be dodgy. Ark! Gosh the...”

A cack up on the back brought silence. “Not now, Pats,” said the Captain. In the corner of a green screen, Ron and Rex caught ten pears from the heavens.

Ron raised a grumpy frowny mug to his lips and said, “Right, but this is the best of places for earthshattering revolutions.” Ron took a sip of tea, washed, punched his chest a few times and exhaled, “Strong stuff. Come, but spell the future.”

“All right. The word is that the Etrian Club has decided on RCWG.” Ron looked at the ceiling, then at the floor, and then took another look at the ceiling.

“A what?” asked Rex.

Rex, his voice tinged with impatience, said, “A random word generator.”

“A what?”

“Every system needs a code word to gain entry, right? Now what they appear to have is a device that looks at and changes the code word every thirty seconds.”

“Sounds smart to me.”

“Look if it’s true they’ll be able to put every hacker out of business but the catch is that the operators won’t be able to gain access either. We’ll have thousands of systems that nobody will be able to get into. Complete disaster.”

Ron took a final gulp of tea and stood up. “Sounds like it’s time to go, the street club is vast.”

Ron and Rex stood on the corner of a backstreet. A huge building with no windows stood on the other side of the street. There was a single door.

“Well that’s it,” said Rex. “It’s up to you now. Just one word of warning. They’ll be watching you so don’t just go in to the door and knock. Do something drastic if they’ll want you straight away.”

“They want something drastic, but? Okay, walk this.”

Ron hopped for a couple of steps, walked sideways a couple of times, walked sideways and with a final hop, step and a jump he was in the door.

“That should convince them,” thought Ron. He looked on the door. The hatch did look a bit odd. “Yes!” came a voice from within.

“The hatch is open, I want to join the club.”

“What does that?”

The hatch did shut. Ron looked up and down the street but saw no one. Suddenly he felt someone trying to open the hatch. He looked down and saw two hands using a grubby tool to pry the handle.

The hatch flew open and he felt a tape system around his neck. The hands at his feet pushed the grubby lever and tied a bow around. Ron was pulled high against the door and the door was closing upwards slowly. Blood rushed to Ron’s head and he knew that in a few seconds he would be upside down on the guide. “Help my feet doesn’t fall off!” thought Ron.

Next week! Dramatically speaking.

BEGINNING MACHINE CODE

Time to wind up our machine code series by Terry and Diana Smith with hints and tips for future projects

This is the last article in our series on machine code for the Spectrum. We hope that the series has given you enough information to understand the inner workings of the machine code routines published in the magazine and will encourage

you to have a go at developing your own. By way of wrapping up the series, we will go over some of the techniques that should make machine code programming a little easier.

Finally, let's consider when to get machine code. The main benefits of code are the very

fast execution speeds and the ability to get away from the Spectrum's BASIC operating system. Routines can generally be written to lower bytes with code than in BASIC but this is not always the case. The block move and block search routines described in part 7 are examples of the real advantages of machine code, namely very fast, compact code.

On the other hand, Spectrum BASIC offers an excellent program editor and a relatively easy-to-use debugger. If you have tried to make any significant changes to our examples or have had a good working your own routines, you will have realised that debugging machine code can be quite trying!

So, it comes down to horses for courses. For arcade-type games or routines that are really unacceptably slow in BASIC, machine code is justified if you are writing a program with a lot, or even a little, number-crunching in it, stick to BASIC. Trying to write floating-point arithmetic routines when they already exist in BASIC has got to be a mistake reserved for masochists.

One way of having your cake and eating it is to use a compiler. This is a program which reads your BASIC program and translates it into machine code for you. This is achieved by using a number of machine code routines as building blocks with which to simulate the BASIC program. They do not produce the most elegant code because they have to cope with the flexibility of the BASIC commands. On the other hand they will almost certainly save a lot of headache. Many compilers are not able to handle floating-point numbers or the string functions though, so if you decide to take the short cut, make sure the compiler you buy will cover your needs.

While we are talking of buying things, if you have decided to take the plunge and try your hand at code, you would be well advised to get an assembler. Compilers are very good at doing boring repetitive tasks like looking up the machine code for instructions and calculating source pointers and address within routines. So, be true to your computer and give it some exercise! It will quickly repay the frustration of reassembling jump displacements.

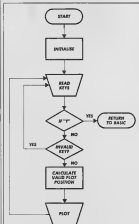


Fig 3. Howshot of "Sketch" routine see Part 6 Listing 1

Keynote = process operation

Decision = decision

Trapezoid = input or output

ments for the eighteenth issue.

The index book of the trade are books. There is also a large choice of books on Spectrum machine code, varying from the simple to the advanced. Averaging the range you ought to find one that will suit your needs. Many will give details of useful routines in the ROM, indeed one of the most useful is the ROM disassembly by Logan and O'Hara.

Given that river library is complete, your assembler is loaded and you are full of enthusiasm to begin entering code, what is the best way of writing a routine? Firstly, scratch off the Spectrum and find pencil and paper. Then break your idea down from a general concept into smaller and smaller sections.

Be clear about what each routine and sub-routine is meant to do. Get into the habit of writing plans of more about your routine, especially any repeat the routine requires in

order to run and the output it produces. It may seem to be a great idea at the time but will prove worthwhile when you come back to use the routine in another program months later.

One common method used to develop all computer programs is the flowchart. Figure 1 shows the initial flowchart used to write the keyboard reading routine given as Listing 1 in part 6 of this article. If you take back to that listing, you will see that the "Calculate valid plot position" box was nearly expanded to produce a working routine.

You may also find it helpful to write your routines in BASIC first and then translate them into code. Again, this may not produce the most elegant code but if it works, why worry?

There is an advantage in writing relocatable code for routines that you may use in a number of programs. The irrelocatable means that the machine code routines can be



loaded anywhere in RAM and will run. The asplets that so direct jumps or addresses are used.

So, we come to the end. The extension of the series has been to introduce Spectrum 2M machine code to beginners and to show, by a number of short but useful routines, what is

possible using the main common instructions. Those who have been bitten by the coding "bug" can now get one of the available books and learn about the alternate registers, the interrupts which allow the Spectrum to appear to do two things at once, etc. Happy coding.

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